ABSORPTION OF NITRIC OXIDE INTO AQUEOUS SOLUTIONS OF [Fe$^{II}$(EDTA)]$^{2-}$ WITH SODIUM HYPOPHOSPHITE AND REDUCTION KINETICS OF [Fe$^{III}$(EDTA)]$^{3-}$ BY SODIUM HYPOPHOSPHITE

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Abstract

The absorption of NO into aqueous solutions of [Fe$^{II}$(EDTA)]$^{2-}$ and sodium hypophosphite was carried out in a bubble reactor and sodium hypophosphite was used as a reductant to reduce [Fe$^{III}$(EDTA)]$^{3-}$ generated by [Fe$^{II}$(EDTA)]$^{2-}$ oxidation. The results show that sodium hypophosphite can effectively reduce the [Fe$^{III}$(EDTA)]$^{3-}$ and improve the absorption efficiency of NO. The reduction rate of [Fe$^{III}$(EDTA)]$^{3-}$ increases with the increase in temperature and pH. The stoichiometry and reduction kinetics of [Fe$^{III}$(EDTA)]$^{3-}$ by sodium hypophosphite was achieved according to the influence of different sodium hypophosphite concentrations, temperature, and pH on the reduction rate. The activation energy of reducing [Fe$^{III}$(EDTA)]$^{3-}$ by sodium hypophosphite is calculated to be 33.172 kJ/mol. The reduction kinetics of [Fe$^{III}$(EDTA)]$^{3-}$ by sodium hypophosphite in the air was obtained, and the agreement between the experimental results and simulation results was excellent.

Key words: [Fe$^{II}$(EDTA)]$^{2-}$, kinetics, nitric oxide, reduction, sodium hypophosphite

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